

ROTH TerraStar Heat Pumps V-Series WATER-TO-AIR



Two-Stage, R-410a
Packaged Vertical
Unit Specification Catalog
P/N 2300100903



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Product Introduction & Unit Features

Roth is turning the geothermal heat pump industry in a new direction! Roth's® RXT Series is the first ever multi-position packaged geothermal heat pump, providing the ultimate in flexibility for distributors and dealers. The appliance style, quiet operation, and ultra high efficiencies will certainly please homeowners, too. The RXT series was designed with the dealer and distributor in mind, but the homeowner will benefit as a result. Some of the industry-leading features and benefits are listed below.

- Appliance grade cabinet looks like no other geothermal heat pump on the market. The two-toned access panels with rounded corners will be a hit with consumers, but are also near airtight, increasing indoor air quality.
- Quadruple compressor isolation (high density steel/foam layer, rubber grommets, and two layers of insulation) provides the best combination of sound/vibration absorption available, making RXT the quietest geothermal heat pump available.
- Patent-pending design provides a foamed-in water-to-refrigerant coaxial heat exchanger that not only prevents condensation, potentially leading to premature failure, but also includes a sleeved opening for downflow configuration. This feature means higher reliability and less SKUs.
- Rail mounted blower assembly makes conversion from upflow to downflow a breeze, and increases serviceability.
- Remote-mount control box provides eye level access for easier wiring and service, and also allows the unit to be installed as left hand or right hand return.
- Stainless steel drain pan and e-coated air coil increase unit life expectancy.
- Copeland® UltraTech® two-stage compressor and variable speed ECM fan motor adjust to heating and cooling requirements, contributing to unmatched comfort.
- The best available warranty in the industry insures peace of mind. The ten-year standard warranty coupled with a lifetime cabinet, coaxial heat exchanger, and compressor warranty (to the original owner) is head and shoulders above any geothermal product on the market today.
- Heat exchanger design and component selection combine to create extremely high cooling EER and some of the highest heating capacities and COPs on the market today.

Unit Features at a Glance

- Non-Ozone Depleting R-410A Refrigerant
- Rugged Multi-Position Powder Coated Steel Cabinet Construction with Two-Tone Accent Panels
- All Panels Removable for Easy Service
- Coated Air Coils For Extended Life
- Bidirectional Expansion Valve
- ECM Blower Motor
- Corrosion-Proof, Stainless Steel Drain Pan
- ETL Certified to UL & CSA Standards
- AHRI Certified to ISO Standards
- Copper Coaxial Water Heat Exchanger
- Flow Switch Protected
- Fault Retry To Eliminate Nuisance Service Calls
- High Efficiency Copeland UltraTech Scroll Compressor
- 10 Year Limited Residential Warranty

Optional features

- Hot Water Generator (Desuperheater)
- Field Installed Internal Electric Heat
- CuproNickel Heat Exchanger

Unit Performance:

AHRI Data - Single Compressor Units

Ground Loop Heat Pump

Model	Capacity	Heating		Cooling	
		Btu/hr	COP	Btu/hr	EER
RXT024	Full Load	Future Model			
	Part Load				
RXT036	Full Load	28,500	4.1	38,900	18.2
	Part Load	22,000	4.8	29,000	28.4
RXT048	Full Load	42,500	4.0	53,500	17.7
	Part Load	33,500	4.7	42,400	25.2
RXT060	Full Load	50,000	3.8	65,500	17.6
	Part Load	39,500	4.3	48,600	23.5
RXT072	Full Load	60,000	3.9	70,000	15.6
	Part Load	50,000	4.3	56,500	20.3



Note:

Rated in accordance with ISO Standard 13256-1 which includes Pump Penalties.

Heating capacities based on 68.0°F DB, 59.0°F WB entering air temperature.

Cooling capacities based on 80.6°F DB, 66.2°F WB entering air temperature.

Entering water temperatures Full Load: 32°F heating / 77°F cooling.

Entering water temperatures Part Load: 41°F heating / 68°F cooling.

Ground Water Heat Pump

Model	Capacity	Heating		Cooling	
		Btu/hr	COP	Btu/hr	EER
RXT024	Full Load	Future Models			
	Part Load				
RXT036	Full Load	34,300	4.5	39,800	22.0
	Part Load	23,800	5.1	29,000	32.2
RXT048	Full Load	53,300	4.6	56,500	21.7
	Part Load	37,600	5.1	43,100	28.7
RXT060	Full Load	61,200	4.5	67,200	20.9
	Part Load	43,900	4.8	50,700	27.3
RXT072	Full Load	73,600	4.4	72,300	18.3
	Part Load	54,300	4.6	57,900	23.1

Note:

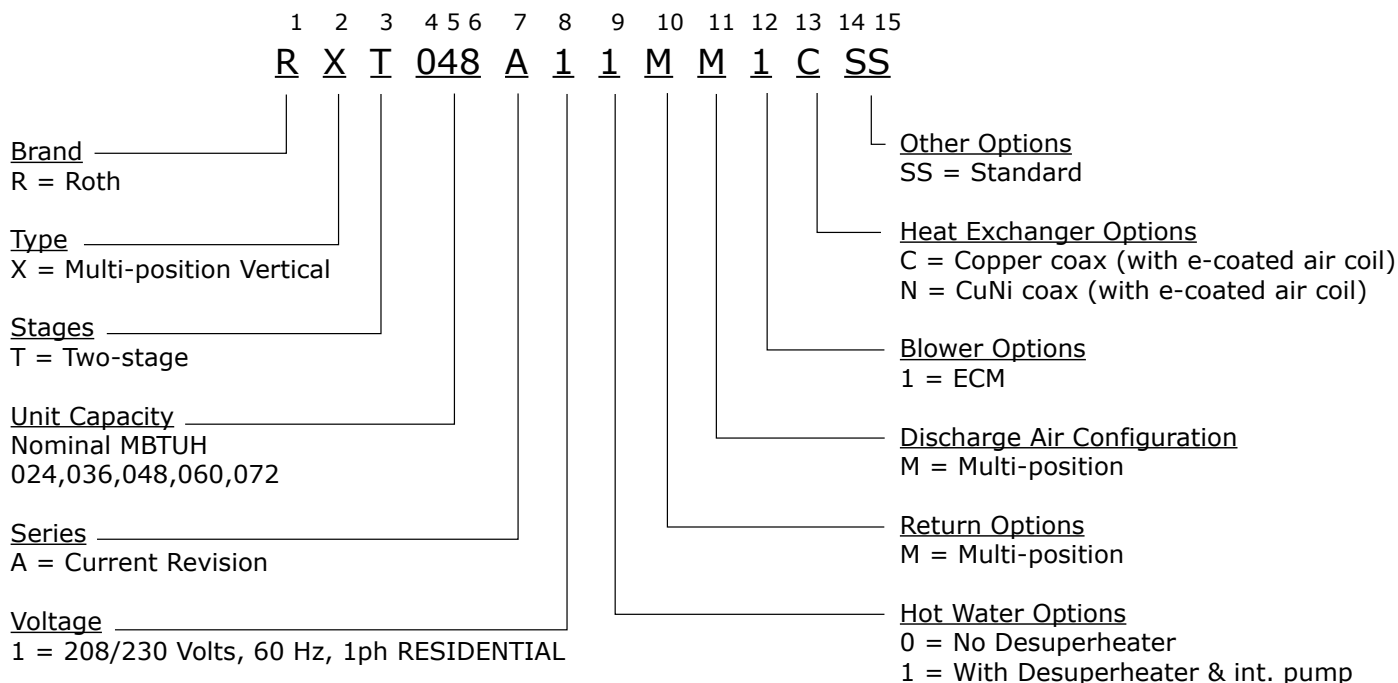
Rated in accordance with ISO Standard 13256-1 which includes Pump Penalties.

Heating capacities based on 68.0°F DB, 59.0°F WB entering air temperature.

Cooling capacities based on 80.6°F DB, 66.2°F WB entering air temperature.

Entering water temperatures: 50°F heating / 59°F cooling.

Unit Nomenclature:



Glossary

Glossary of Terms

CFM = Airflow, Cubic Feet/Minute	HR = Total Heat Of Rejection, Btu/hr
COP = Coefficient of Performance = BTU Output / BTU Input	KW = Total Power Unit Input, Kilowatts
DH = Desuperheater Capacity, Btu/hr	LAT = Leaving Air Temperature, Fahrenheit
EAT = Entering Air Temperature, Fahrenheit (Dry Bulb/Wet Bulb)	LC = Latent Cooling Capacity, Btu/hr
EER = Energy Efficiency Ratio = BTU output/Watts input	SC = Sensible Cooling Capacity, Btu/hr
EWT = Entering Source Water Temperature, Fahrenheit	LWT = Leaving Source Water Temperature, Fahrenheit
ELT = Entering Load Water Temperature, Fahrenheit	LLT = Leaving Load Water Temperature, Fahrenheit
GPM = Water Flow, Gallons Per Minute	TC = Total Cooling Capacity, Btu/hr
HC = Total Heating Capacity, Btu/hr	WPD = Water Pressure Drop, PSI & Feet of Water
HE = Total Heat Of Extraction, Btu/hr	

Calculations, Water Flow Selection, & Performance Data Notes

Heating & Cooling Calculations

Heating	Cooling
$LAT = EAT + \frac{HC}{CFM \times 1.08}$	$LAT (DB) = EAT (DB) - \frac{SC}{CFM \times 1.08}$
$LWT = EWT - \frac{HE}{GPM \times 500}$	$LWT = EWT + \frac{HR}{GPM \times 500}$
$LC = TC - SC$	

Water Flow Selection

Proper flow rate is crucial for reliable operation of geothermal heat pumps. The performance data shows three flow rates for each entering water temperature (EWT column). The general "rule of thumb" when selecting flow rates is the following:

Top flow rate: Open loop systems (1.5 to 2.0 gpm per ton)

Middle flow rate: Minimum closed loop system flow rate (2.25 to 2.50 gpm/ton)

Bottom flow rate: Nominal (optimum) closed loop system flow rate (3.0 gpm/ton)

Although the "rule of thumb" is adequate in most areas of North America, it is important to consider the application type before applying this "rule of thumb." Antifreeze is generally required for all closed loop (geothermal) applications. Extreme Southern U.S. locations are the only exception. Open loop (well water) systems cannot use antifreeze, and must have enough flow rate in order to avoid freezing conditions at the Leaving Source Water Temperature (LWT) connection.

Calculations must be made for all systems without antifreeze to determine if the top flow rate is adequate to prevent LWT at or near freezing conditions. The following steps should be taken in making this calculation:

Determine minimum EWT based upon your geographical area.

Go to the performance data table for the heat pump model selected and look up the Heat of Extraction (HE) at the "rule of thumb" water flow rate (GPM) and at the design Entering Air Temperature (EAT).

Calculate the temperature difference (TD) based upon the HE and GPM of the model (step 4).

$TD = HE / (GPM \times 500)$.

Calculate the LWT (step 6).

$LWT = EWT - TD$.

If the LWT is below 35-38°F, there is potential for freezing conditions if the flow rate or water temperature is less than ideal conditions, and the flow rate must be increased.

Example 1:

EWT = 50°F.

Model RXT048, high capacity. Flow rate = 6 GPM.

Air Flow = 1500 CFM. HE = 36,700 Btuh.

$TD = 36,700 / (6 \times 500) = 12.2^\circ F$

$LWT = 50 - 12.2 = 37.8^\circ F$

Since the water flow is leaving at approximately 38°F, the flow rate is acceptable.

Example 2:

EWT = 40°F.

Model RXT048, high capacity. Flow rate = 6 GPM.

Air Flow = 1500 CFM. HE = 36,700 Btuh.

$TD = 36,700 / (6 \times 500) = 12.2^\circ F$

$LWT = 40 - 12.2 = 27.8^\circ F$

Water flow rate must be increased to avoid freezing.

Performance Data Notes

- Capacity data includes water pumping watts and is based upon 15% (by volume) propylene glycol antifreeze solution.
- Desuperheater capacity is based upon 0.4 GPM Flow per nominal ton at 90°F entering hot water temperature.
- Interpolation between above categories is permissible; extrapolation is not.
- See Flow Rate Selection above for proper application.

RXT036 Performance Data: Part Load

3.0 Ton, 1050 CFM Heating / 1050 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	9.0	4.4	10.2	850	17.3	12.0	88.8	1.55	3.27	2.3	Operation Not Recommended							
				1050	17.5	12.3	85.4	1.51	3.40	2.3								
30	4.5	1.0	2.3	850	17.9	12.6	89.5	1.56	3.36	2.4								
				1050	18.2	13.0	86.0	1.52	3.51	2.4								
	7.0	2.5	5.8	850	18.6	13.3	90.3	1.56	3.49	2.5								
				1050	18.9	13.7	86.7	1.52	3.64	2.5								
	9.0	4.2	9.7	850	18.7	13.4	90.4	1.56	3.51	2.5								
				1050	19.0	13.8	86.8	1.52	3.66	2.5								
40	4.5	1.0	2.3	850	20.7	15.3	92.5	1.57	3.86	2.7								
				1050	21.0	15.8	88.5	1.53	4.02	2.8								
	7.0	2.3	5.3	850	21.5	16.1	93.4	1.58	3.99	2.9								
				1050	21.8	16.6	89.2	1.53	4.17	2.9								
	9.0	3.9	9.0	850	21.6	16.2	93.5	1.57	4.03	2.9								
				1050	21.9	16.7	89.3	1.53	4.19	3.0								
50	4.5	0.9	2.1	850	23.5	18.1	95.6	1.59	4.33	3.0	850	29.4	20.6	0.70	32.8	1.01	29.1	2.4
				1050	23.9	18.6	91.1	1.54	4.55	3.1	1050	30.3	22.0	0.73	33.9	1.06	28.6	2.6
	7.0	2.2	5.1	850	24.4	18.9	96.6	1.60	4.47	3.2	850	29.9	20.8	0.70	33.1	0.95	31.5	2.3
				1050	24.8	19.5	91.9	1.56	4.66	3.3	1050	30.7	22.1	0.72	34.1	1.00	30.7	2.4
	9.0	3.6	8.3	850	24.5	19.0	96.7	1.60	4.49	3.2	850	30.0	20.6	0.69	33.2	0.93	32.3	2.2
				1050	24.9	19.6	92.0	1.56	4.68	3.3	1050	30.9	22.0	0.71	34.2	0.98	31.5	2.3
60	4.5	0.8	1.8	850	26.3	20.8	98.6	1.61	4.79	3.5	850	28.2	19.9	0.71	32.1	1.13	25.0	3.0
				1050	26.7	21.4	93.5	1.56	5.01	3.6	1050	29.1	21.2	0.73	33.2	1.19	24.5	3.2
	7.0	2.0	4.6	850	27.3	21.8	99.7	1.61	4.97	3.6	850	28.7	20.1	0.70	32.4	1.07	26.8	2.7
				1050	27.7	22.3	94.4	1.57	5.17	3.6	1050	29.5	21.4	0.73	33.3	1.12	26.3	2.9
	9.0	3.3	7.6	850	27.4	21.9	99.8	1.61	4.99	3.6	850	28.8	19.9	0.69	32.4	1.05	27.4	2.6
				1050	27.8	22.5	94.5	1.56	5.22	3.8	1050	29.6	21.2	0.72	33.4	1.10	26.9	2.8
70	4.5	0.8	1.8	850	29.0	23.4	101.6	1.63	5.21	3.8	850	26.9	19.3	0.72	31.3	1.28	21.0	3.5
				1050	29.4	24.0	95.9	1.58	5.45	3.9	1050	27.7	20.6	0.74	32.3	1.35	20.5	3.7
	7.0	1.9	4.4	850	30.0	24.4	102.7	1.63	5.39	3.9	850	27.3	19.5	0.71	31.4	1.21	22.6	3.2
				1050	30.5	25.1	96.9	1.59	5.62	4.0	1050	28.2	20.7	0.73	32.5	1.27	22.2	3.4
	9.0	3.1	7.2	850	30.2	24.6	102.9	1.63	5.43	3.9	850	27.5	19.3	0.70	31.6	1.19	23.1	3.1
				1050	30.6	25.2	97.0	1.58	5.67	4.0	1050	28.3	20.6	0.73	32.6	1.25	22.6	3.3
80	4.5	0.7	1.6	850	31.5	25.9	104.3	1.64	5.63	4.2	850	25.6	18.7	0.73	30.6	1.46	17.5	3.9
				1050	32.0	26.5	98.2	1.60	5.86	4.2	1050	26.3	19.9	0.76	31.5	1.53	17.2	4.2
	7.0	1.8	4.2	850	32.7	27.1	105.6	1.65	5.81	4.3	850	25.9	18.9	0.73	30.6	1.38	18.8	3.7
				1050	33.2	27.7	99.3	1.60	6.08	4.3	1050	26.7	20.1	0.75	31.6	1.45	18.4	3.9
	9.0	2.9	6.7	850	32.8	27.2	105.7	1.64	5.86	4.4	850	26.1	18.7	0.72	30.7	1.35	19.3	3.6
				1050	33.3	27.8	99.4	1.60	6.10	4.5	1050	26.8	19.9	0.74	31.6	1.42	18.9	3.8
90	4.5	0.7	1.6	850	33.9	28.2	106.9	1.66	5.98	4.4	850	24.1	18.1	0.75	29.8	1.66	14.5	4.4
				1050	34.4	28.9	100.3	1.61	6.26	4.5	1050	24.8	19.3	0.78	30.8	1.75	14.2	4.7
	7.0	1.7	3.9	850	35.1	29.4	108.2	1.66	6.20	4.6	850	24.4	18.2	0.75	29.8	1.57	15.5	4.1
				1050	35.7	30.2	101.5	1.62	6.46	4.7	1050	25.1	19.4	0.77	30.7	1.65	15.2	4.4
	9.0	2.8	6.5	850	35.3	29.6	108.5	1.66	6.23	4.7	850	24.5	18.1	0.74	29.8	1.54	15.9	3.9
				1050	35.8	30.3	101.6	1.61	6.52	4.8	1050	25.3	19.3	0.76	30.8	1.62	15.6	4.2
100	4.5	0.6	1.4	Operation Not Recommended							850	22.5	17.4	0.77	29.0	1.89	11.9	4.9
											1050	23.1	18.6	0.81	29.9	1.99	11.6	5.2
	7.0	1.6	3.7								850	22.8	17.6	0.77	28.9	1.79	12.7	4.6
											1050	23.5	18.7	0.80	29.9	1.88	12.5	4.9
	9.0	2.6	6.0								850	22.9	17.4	0.76	28.9	1.75	13.1	4.4
											1050	23.6	18.6	0.79	29.9	1.84	12.8	4.7
110	4.5	0.6	1.4								850	20.8	16.7	0.80	28.1	2.15	9.7	5.4
											1050	21.4	17.7	0.83	29.1	2.26	9.5	5.7
	7.0	1.5	3.5								850	21.1	16.8	0.80	28.0	2.03	10.4	5.1
											1050	21.7	17.9	0.82	29.0	2.14	10.1	5.4
	9.0	2.4	5.5								850	21.2	16.6	0.78	28.0	1.99	10.7	4.9
											1050	21.8	17.7	0.81	29.0	2.10	10.4	5.2

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT036 Performance Data: Full Load

3.0 Ton, 1300 CFM Heating / 1300 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	9.0	4.4	10.2	1050	25.6	18.3	92.5	2.25	3.33	3.6	Operation Not Recommended							
				1300	27.1	19.6	89.3	2.21	3.59	3.6								
30	4.5	1.0	2.3	1050	24.5	17.4	91.6	2.20	3.27	3.5								
				1300	26.0	18.6	88.5	2.16	3.53	3.5								
	7.0	2.5	5.8	1050	27.0	19.6	93.8	2.28	3.47	3.8								
				1300	28.6	21.0	90.4	2.23	3.76	3.8								
	9.0	4.2	9.7	1050	27.5	20.0	94.2	2.29	3.51	3.8								
				1300	29.1	21.4	90.7	2.25	3.79	3.8								
40	4.5	1.0	2.3	1050	27.8	20.4	94.5	2.29	3.56	4.0								
				1300	29.5	21.8	91.0	2.25	3.84	4.1								
	7.0	2.3	5.3	1050	30.7	22.9	97.0	2.37	3.79	4.3								
				1300	32.5	24.5	93.1	2.33	4.09	4.3								
	9.0	3.9	9.0	1050	31.3	23.6	97.6	2.39	3.84	4.4								
				1300	33.2	25.2	93.6	2.35	4.14	4.5								
50	4.5	0.9	2.1	1050	31.2	23.5	97.5	2.40	3.81	4.4	1050	40.7	26.7	0.66	47.2	1.89	21.5	3.2
				1300	33.1	25.1	93.6	2.35	4.13	4.4	1300	41.7	29.2	0.70	48.6	2.02	20.6	3.5
	7.0	2.2	5.1	1050	34.3	26.3	100.3	2.48	4.06	4.8	1050	41.4	26.7	0.64	47.6	1.82	22.7	3.0
				1300	36.4	28.1	95.9	2.43	4.39	4.8	1300	42.4	29.2	0.69	49.1	1.95	21.7	3.3
	9.0	3.6	8.3	1050	35.0	26.8	100.9	2.50	4.10	4.9	1050	41.6	26.8	0.64	47.6	1.76	23.6	2.8
				1300	37.1	28.7	96.4	2.45	4.44	4.9	1300	42.6	29.3	0.69	49.0	1.88	22.7	3.1
60	4.5	0.8	1.8	1050	34.5	26.4	100.4	2.51	4.03	4.9	1050	39.3	26.2	0.67	46.3	2.06	19.1	3.9
				1300	36.6	28.2	96.1	2.46	4.36	5.1	1300	40.3	28.6	0.71	47.8	2.20	18.3	4.3
	7.0	2.0	4.6	1050	38.0	29.5	103.5	2.59	4.30	5.3	1050	40.0	26.2	0.66	46.8	1.99	20.1	3.7
				1300	40.3	31.6	98.7	2.54	4.65	5.4	1300	41.0	28.6	0.70	48.2	2.12	19.3	4.0
	9.0	3.3	7.6	1050	38.8	30.2	104.2	2.61	4.35	5.4	1050	40.2	26.2	0.65	46.8	1.92	20.9	3.5
				1300	41.1	32.3	99.3	2.57	4.69	5.4	1300	41.2	28.7	0.70	48.2	2.05	20.1	3.8
70	4.5	0.8	1.8	1050	37.8	29.3	103.4	2.63	4.21	5.3	1050	37.8	25.7	0.68	45.4	2.24	16.9	4.6
				1300	40.1	31.3	98.6	2.58	4.55	5.3	1300	38.8	28.1	0.72	47.0	2.39	16.2	5.0
	7.0	1.9	4.4	1050	41.7	32.8	106.8	2.72	4.49	5.8	1050	38.5	25.7	0.67	45.9	2.16	17.8	4.3
				1300	44.2	35.1	101.5	2.67	4.85	5.8	1300	39.4	28.1	0.71	47.3	2.31	17.1	4.7
	9.0	3.1	7.2	1050	42.5	33.5	107.4	2.74	4.54	5.9	1050	38.7	25.8	0.67	45.8	2.09	18.5	4.1
				1300	45.0	35.8	102.1	2.69	4.90	5.9	1300	39.6	28.2	0.71	47.2	2.23	17.8	4.5
80	4.5	0.7	1.6	1050	41.2	32.2	106.4	2.76	4.38	5.8	1050	36.2	25.1	0.69	44.6	2.45	14.8	5.2
				1300	43.7	34.5	101.1	2.71	4.72	6.0	1300	37.1	27.4	0.74	46.0	2.62	14.2	5.7
	7.0	1.8	4.2	1050	45.4	36.0	110.0	2.85	4.67	6.4	1050	36.8	25.1	0.68	44.9	2.36	15.6	4.9
				1300	48.1	38.5	104.3	2.80	5.03	6.4	1300	37.7	27.5	0.73	46.3	2.52	15.0	5.4
	9.0	2.9	6.7	1050	46.2	36.7	110.8	2.88	4.70	6.5	1050	36.9	25.2	0.68	44.7	2.28	16.2	4.8
				1300	49.0	39.3	104.9	2.83	5.07	6.4	1300	37.9	27.5	0.73	46.2	2.44	15.5	5.2
90	4.5	0.7	1.6	1050	44.6	35.1	109.3	2.91	4.49	6.2	1050	34.2	24.4	0.71	43.4	2.69	12.7	5.9
				1300	47.3	37.6	103.7	2.85	4.86	6.2	1300	35.0	26.6	0.76	44.8	2.88	12.2	6.4
	7.0	1.7	3.9	1050	49.2	39.3	113.3	3.00	4.80	6.9	1050	34.7	24.4	0.70	43.6	2.60	13.3	5.5
				1300	52.1	42.0	107.1	2.95	5.17	6.9	1300	35.6	26.6	0.75	45.1	2.77	12.9	6.0
	9.0	2.8	6.5	1050	50.1	40.2	114.2	3.03	4.84	7.0	1050	34.9	24.4	0.70	43.5	2.51	13.9	5.4
				1300	53.1	43.0	107.8	2.97	5.24	7.0	1300	35.8	26.7	0.75	44.9	2.68	13.4	5.9
100	4.5	0.6	1.4	Operation Not Recommended							1050	31.8	23.3	0.73	42.0	2.98	10.7	6.4
											1300	32.6	25.4	0.78	43.5	3.19	10.2	7.0
	7.0	1.6	3.7								1050	32.3	23.3	0.72	42.1	2.88	11.2	6.1
											1300	33.1	25.4	0.77	43.6	3.07	10.8	6.7
	9.0	2.6	6.0								1050	32.5	23.4	0.72	42.0	2.78	11.7	5.9
											1300	33.3	25.5	0.77	43.4	2.97	11.2	6.4
110	4.5	0.6	1.4								1050	28.9	21.7	0.75	40.3	3.33	8.7	6.9
											1300	29.7	23.8	0.80	41.8	3.55	8.4	7.6
	7.0	1.5	3.5								1050	29.4	21.8	0.74	40.4	3.21	9.2	6.7
											1300	30.2	23.8	0.79	41.9	3.43	8.8	7.3
	9.0	2.4	5.5								1050	29.6	21.8	0.74	40.2	3.10	9.5	6.3
											1300	30.3	23.8	0.79	41.6	3.31	9.2	6.9

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT048 Performance Data: Part Load

4.0 Ton, 1400 CFM Heating / 1400 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	HR MBtuh	EER Btuh/W	DH MBtuh		
		PSI	FT															
25	9.0	4.8	11.1	1150	23.1	16.0	88.6	2.09	3.24	3.0	Operation Not Recommended							
				1400	26.1	18.8	87.3	2.14	3.57	3.4								
30	4.5	1.1	2.5	1150	23.5	16.3	88.9	2.10	3.28	3.1								
				1400	26.5	19.2	87.5	2.15	3.61	3.5								
	7.0	2.8	6.5	1150	24.9	17.7	90.0	2.12	3.44	3.3								
				1400	28.0	20.6	88.5	2.17	3.78	3.7								
	9.0	4.6	10.6	1150	25.5	18.3	90.5	2.12	3.52	3.4								
				1400	28.7	21.3	89.0	2.17	3.88	3.8								
40	4.5	1.1	2.5	1150	27.7	20.4	92.3	2.15	3.77	3.9								
				1400	31.2	23.7	90.6	2.20	4.16	4.0								
	7.0	2.6	6.0	1150	29.3	21.9	93.6	2.17	3.96	4.1								
				1400	33.0	25.4	91.8	2.22	4.36	4.2								
	9.0	4.2	9.7	1150	30.0	22.6	94.2	2.18	4.03	4.2								
				1400	33.8	26.2	92.4	2.22	4.46	4.5								
50	4.5	1.0	2.3	1150	31.7	24.3	95.5	2.17	4.28	4.2	1150	39.9	28.1	0.70	45.2	1.54	25.9	3.3
				1400	35.7	28.1	93.6	2.22	4.71	4.7	1400	40.4	30.8	0.76	45.9	1.60	25.3	3.6
	7.0	2.4	5.5	1150	33.5	26.0	97.0	2.21	4.44	4.4	1150	40.5	28.4	0.70	45.4	1.44	28.1	3.2
				1400	37.8	30.1	95.0	2.26	4.90	5.0	1400	41.0	31.1	0.76	46.1	1.49	27.5	3.5
	9.0	4.0	9.2	1150	34.3	26.7	97.6	2.23	4.51	4.5	1150	40.4	28.3	0.70	45.2	1.41	28.7	3.0
				1400	38.7	30.9	95.6	2.28	4.97	5.1	1400	40.8	31.0	0.76	45.8	1.46	27.9	3.3
60	4.5	0.9	2.1	1150	35.6	28.0	98.7	2.24	4.66	5.0	1150	39.6	27.9	0.70	45.5	1.73	22.9	4.1
				1400	40.1	32.3	96.5	2.29	5.13	5.2	1400	40.1	30.6	0.76	46.2	1.79	22.4	4.5
	7.0	2.3	5.3	1150	37.6	29.9	100.3	2.26	4.87	5.3	1150	40.2	28.2	0.70	45.7	1.61	25.0	3.9
				1400	42.4	34.5	98.0	2.31	5.38	5.4	1400	40.7	30.9	0.76	46.4	1.67	24.4	4.3
	9.0	3.7	8.5	1150	38.5	30.8	101.0	2.26	4.99	5.4	1150	40.1	28.1	0.70	45.5	1.58	25.4	3.7
				1400	43.4	35.5	98.7	2.31	5.50	5.7	1400	40.6	30.8	0.76	46.2	1.64	24.8	4.1
70	4.5	0.9	2.1	1150	39.4	31.6	101.7	2.28	5.06	5.2	1150	38.5	27.3	0.71	45.1	1.94	19.8	4.8
				1400	44.4	36.4	99.4	2.33	5.58	5.9	1400	38.9	29.9	0.77	45.8	2.01	19.4	5.3
	7.0	2.1	4.9	1150	41.7	33.9	103.6	2.30	5.31	5.5	1150	39.0	27.6	0.71	45.1	1.80	21.7	4.6
				1400	47.0	39.0	101.1	2.35	5.86	6.2	1400	39.5	30.2	0.76	45.9	1.87	21.1	5.0
	9.0	3.5	8.1	1150	42.7	34.9	104.4	2.30	5.44	5.7	1150	38.9	27.5	0.71	44.9	1.77	22.0	4.4
				1400	48.1	40.1	101.8	2.35	6.00	6.4	1400	39.4	30.1	0.76	45.6	1.83	21.5	4.8
80	4.5	0.8	1.8	1150	43.2	35.3	104.8	2.32	5.46	6.1	1150	36.7	26.5	0.72	44.1	2.17	16.9	5.6
				1400	48.7	40.6	102.2	2.37	6.02	6.3	1400	37.1	29.0	0.78	44.8	2.26	16.4	6.1
	7.0	2.0	4.6	1150	45.7	37.7	106.8	2.34	5.72	6.4	1150	37.2	26.8	0.72	44.1	2.02	18.4	5.2
				1400	51.5	43.3	104.1	2.39	6.31	6.6	1400	37.6	29.3	0.78	44.8	2.10	17.9	5.7
	9.0	3.4	7.9	1150	46.8	38.8	107.7	2.35	5.84	6.6	1150	37.1	26.7	0.72	43.9	1.99	18.6	5.0
				1400	52.8	44.6	104.9	2.40	6.45	6.9	1400	37.5	29.2	0.78	44.5	2.06	18.2	5.5
90	4.5	0.8	1.8	1150	47.0	38.9	107.8	2.37	5.81	6.2	1150	34.5	25.5	0.74	42.9	2.45	14.1	6.2
				1400	53.1	44.8	105.1	2.43	6.40	7.0	1400	34.9	27.9	0.80	43.6	2.54	13.7	6.8
	7.0	2.0	4.6	1150	49.8	41.6	110.1	2.39	6.11	6.6	1150	35.0	25.8	0.74	42.8	2.28	15.4	5.9
				1400	56.1	47.7	107.1	2.45	6.71	7.4	1400	35.4	28.2	0.80	43.5	2.36	15.0	6.4
	9.0	3.3	7.6	1150	51.0	42.8	111.1	2.40	6.23	6.7	1150	34.9	25.7	0.74	42.5	2.24	15.6	5.7
				1400	57.5	49.1	108.0	2.45	6.88	7.6	1400	35.3	28.1	0.80	43.2	2.32	15.2	6.2
100	4.5	0.8	1.8	Operation Not Recommended							1150	32.2	24.4	0.76	41.7	2.78	11.6	6.9
											1400	32.6	26.7	0.82	42.4	2.88	11.3	7.5
	7.0	1.9	4.4								1150	32.6	24.7	0.76	41.4	2.58	12.6	6.6
											1400	33.0	27.0	0.82	42.1	2.68	12.3	7.2
	9.0	3.2	7.4								1150	32.6	24.6	0.75	41.3	2.54	12.8	6.3
											1400	32.9	26.9	0.82	41.9	2.63	12.5	6.9
110	4.5	0.8	1.8								1150	30.0	23.3	0.78	40.8	3.16	9.5	7.4
											1400	30.3	25.5	0.84	41.5	3.27	9.3	8.1
	7.0	1.9	4.4								1150	30.4	23.5	0.77	40.4	2.93	10.4	7.2
											1400	30.8	25.8	0.84	41.2	3.04	10.1	7.9
	9.0	3.1	7.2								1150	30.3	23.5	0.78	40.1	2.88	10.5	6.9
											1400	30.7	25.7	0.84	40.9	2.99	10.3	7.5

Heating data based on 70°F EAT; Cooling data based on 80/67°F EAT. See Correction Factors on page 14 for different conditions.

RXT048 Performance Data: Full Load

4.0 Ton, 1650 CFM Heating / 1700 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	12.0	8.5	19.6	1500	35.2	25.2	91.7	2.93	3.52	4.6	Operation Not Recommended							
				1650	35.9	25.8	90.1	2.96	3.55	4.7								
30	6.0	2.0	4.6	1500	35.1	25.2	91.7	2.89	3.56	4.6								
				1650	35.9	25.9	90.1	2.92	3.60	4.7								
	9.0	4.6	10.6	1500	36.6	26.6	92.6	2.94	3.65	4.9								
				1650	37.4	27.3	91.0	2.97	3.69	5.0								
	12.0	8.2	18.9	1500	38.5	28.3	93.8	2.99	3.77	5.0								
				1650	39.4	29.1	92.1	3.03	3.81	5.1								
40	6.0	1.9	4.4	1500	41.4	31.1	95.6	3.03	4.00	5.5								
				1650	42.3	31.9	93.7	3.06	4.05	5.7								
	9.0	4.2	9.7	1500	43.2	32.7	96.7	3.08	4.11	5.8								
				1650	44.1	33.5	94.7	3.12	4.14	5.9								
	12.0	7.6	17.6	1500	45.5	34.8	98.1	3.14	4.25	6.1								
				1650	46.4	35.5	96.0	3.18	4.28	6.3								
50	6.0	1.8	4.2	1500	47.6	36.7	99.4	3.19	4.37	6.3	1550	54.8	38.3	0.70	63.6	2.59	21.2	4.3
				1650	48.7	37.7	97.3	3.22	4.43	6.4	1700	55.5	40.1	0.72	64.6	2.68	20.7	4.5
	9.0	4.0	9.2	1500	49.7	38.6	100.7	3.24	4.49	6.6	1550	55.4	38.3	0.69	63.9	2.48	22.3	4.3
				1650	50.8	39.6	98.5	3.28	4.54	6.7	1700	56.0	40.1	0.72	64.7	2.56	21.9	4.5
	12.0	7.0	16.2	1500	52.3	41.0	102.3	3.30	4.64	7.0	1550	55.9	38.5	0.69	64.1	2.40	23.3	4.1
				1650	53.4	42.0	100.0	3.34	4.68	7.1	1700	56.6	40.3	0.71	65.1	2.48	22.8	4.3
60	6.0	1.7	3.9	1500	53.5	42.0	103.0	3.36	4.67	7.1	1550	52.9	37.5	0.71	62.5	2.80	18.9	5.4
				1650	54.6	43.0	100.6	3.40	4.71	7.3	1700	53.5	39.2	0.73	63.4	2.89	18.5	5.6
	9.0	3.7	8.5	1500	55.8	44.1	104.4	3.42	4.78	7.4	1550	53.4	37.4	0.70	62.5	2.67	20.0	5.2
				1650	57.0	45.2	102.0	3.45	4.84	7.6	1700	54.1	39.2	0.72	63.5	2.76	19.6	5.5
	12.0	6.6	15.2	1500	58.7	46.8	106.2	3.48	4.94	7.8	1550	53.9	37.7	0.70	62.7	2.59	20.8	5.0
				1650	59.9	47.9	103.6	3.52	4.99	7.9	1700	54.6	39.4	0.72	63.7	2.68	20.4	5.2
70	6.0	1.6	3.7	1500	58.5	46.4	106.1	3.54	4.84	7.7	1550	50.7	36.4	0.72	61.0	3.01	16.8	6.4
				1650	59.8	47.6	103.6	3.58	4.89	7.9	1700	51.3	38.1	0.74	61.9	3.11	16.5	6.7
	9.0	3.5	8.1	1500	61.1	48.8	107.7	3.61	4.96	8.0	1550	51.2	36.4	0.71	61.0	2.88	17.8	6.1
				1650	62.4	50.0	105.0	3.64	5.02	8.2	1700	51.8	38.1	0.74	61.9	2.97	17.4	6.4
	12.0	6.3	14.6	1500	64.2	51.7	109.6	3.67	5.13	8.4	1550	51.7	36.6	0.71	61.2	2.79	18.5	5.8
				1650	65.6	52.9	106.8	3.71	5.18	8.6	1700	52.3	38.3	0.73	62.2	2.89	18.1	6.1
80	6.0	1.5	3.5	1500	62.5	49.7	108.6	3.74	4.90	8.3	1550	48.3	35.2	0.73	59.4	3.26	14.8	7.3
				1650	63.8	50.9	105.8	3.78	4.95	8.4	1700	48.9	36.8	0.75	60.4	3.37	14.5	7.6
	9.0	3.4	7.9	1500	65.2	52.2	110.2	3.81	5.01	8.6	1550	48.8	35.2	0.72	59.4	3.11	15.7	6.9
				1650	66.6	53.5	107.4	3.85	5.07	8.8	1700	49.4	36.8	0.74	60.4	3.21	15.4	7.2
	12.0	6.0	13.9	1500	68.6	55.4	112.3	3.88	5.18	9.0	1550	49.2	35.4	0.72	59.5	3.02	16.3	6.7
				1650	70.0	56.6	109.3	3.92	5.23	9.0	1700	49.8	37.0	0.74	60.4	3.12	16.0	7.0
90	6.0	1.4	3.2	1500	65.0	51.5	110.1	3.96	4.81	8.6	1550	45.6	33.8	0.74	57.7	3.55	12.8	8.1
				1650	66.3	52.6	107.2	4.00	4.86	8.8	1700	46.2	35.3	0.76	58.7	3.67	12.6	8.5
	9.0	3.3	7.6	1500	67.8	54.0	111.9	4.03	4.93	9.0	1550	46.1	33.7	0.73	57.7	3.39	13.6	7.6
				1650	69.2	55.3	108.8	4.07	4.98	9.2	1700	46.7	35.3	0.76	58.6	3.50	13.3	8.0
	12.0	5.8	13.4	1500	71.3	57.3	114.0	4.10	5.10	9.4	1550	46.5	33.9	0.73	57.7	3.29	14.1	7.4
				1650	72.8	58.6	110.9	4.15	5.14	9.6	1700	47.1	35.5	0.75	58.7	3.40	13.9	7.8
100	6.0	1.4	3.2	Operation Not Recommended							1550	42.8	32.2	0.75	56.1	3.89	11.0	8.9
											1700	43.3	33.7	0.78	57.0	4.02	10.8	9.3
	9.0	3.2	7.4								1550	43.2	32.1	0.74	55.9	3.72	11.6	8.4
											1700	43.8	33.6	0.77	56.9	3.84	11.4	8.8
	12.0	5.6	12.9								1550	43.6	32.3	0.74	55.9	3.61	12.1	8.3
											1700	44.2	33.8	0.76	56.9	3.73	11.8	8.7
110	6.0	1.4	3.2								1550	39.7	30.4	0.77	54.4	4.31	9.2	9.7
											1700	40.2	31.8	0.79	55.4	4.45	9.0	10.1
	9.0	3.1	7.2								1550	40.1	30.4	0.76	54.2	4.12	9.7	9.2
											1700	40.6	31.8	0.78	55.1	4.25	9.6	9.6
	12.0	5.5	12.7								1550	40.5	30.6	0.76	54.2	4.00	10.1	9.2
											1700	41.0	32.0	0.78	55.1	4.13	9.9	9.6

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT060 Performance Data: Part Load

5.0 Ton, 1500 CFM Heating / 1550 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	HR S/T	MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	12.0	5.6	12.9	1350	30.7	21.2	91.1	2.79	3.22	4.1	Operation Not Recommended							
				1500	31.0	21.4	89.1	2.80	3.24	4.1								
30	6.0	1.3	3.0	1350	31.4	21.8	91.5	2.80	3.29	4.2								
				1500	31.7	22.1	89.6	2.82	3.29	4.2								
	10.0	3.7	8.5	1350	32.7	23.1	92.4	2.81	3.41	4.3								
				1500	33.1	23.4	90.4	2.83	3.43	4.4								
	12.0	5.4	12.5	1350	33.0	23.4	92.6	2.81	3.44	4.3								
				1500	33.4	23.8	90.6	2.82	3.47	4.4								
40	6.0	1.2	2.8	1350	35.9	26.2	94.6	2.84	3.70	4.8								
				1500	36.4	26.7	92.5	2.85	3.74	4.9								
	10.0	3.4	7.9	1350	37.5	27.8	95.7	2.85	3.86	5.0								
				1500	37.9	28.1	93.4	2.86	3.88	5.0								
	12.0	4.9	11.3	1350	37.9	28.2	96.0	2.85	3.90	5.0								
				1500	38.3	28.5	93.6	2.86	3.92	5.3								
50	6.0	1.1	2.5	1350	40.6	30.8	97.8	2.86	4.16	5.3	1400	49.9	34.0	0.68	56.5	1.94	25.7	4.0
				1500	41.1	31.3	95.4	2.88	4.18	5.4	1550	50.7	35.8	0.71	57.6	2.01	25.2	4.2
	10.0	3.2	7.4	1350	42.4	32.5	99.1	2.89	4.30	5.6	1400	51.1	34.4	0.67	57.2	1.80	28.4	3.8
				1500	42.9	33.0	96.5	2.90	4.33	5.7	1550	52.0	36.3	0.70	58.4	1.87	27.8	4.0
	12.0	4.6	10.6	1350	42.8	33.0	99.4	2.88	4.35	5.6	1400	51.5	34.5	0.67	57.6	1.78	28.9	3.6
				1500	43.3	33.4	96.7	2.89	4.39	5.7	1550	52.4	36.4	0.69	58.7	1.84	28.5	3.8
60	6.0	1.1	2.5	1350	45.2	35.3	101.0	2.90	4.57	6.0	1400	48.6	33.5	0.69	56.1	2.19	22.2	4.9
				1500	45.8	35.9	98.3	2.91	4.61	6.1	1550	49.4	35.3	0.71	57.1	2.27	21.8	5.2
	10.0	3.0	6.9	1350	47.2	37.3	102.4	2.91	4.75	6.3	1400	49.8	34.0	0.68	56.7	2.03	24.5	4.7
				1500	47.7	37.7	99.4	2.92	4.79	6.3	1550	50.7	35.8	0.71	57.9	2.11	24.0	5.0
	12.0	4.3	9.9	1350	47.6	37.7	102.6	2.90	4.81	6.4	1400	50.2	34.1	0.68	57.0	2.00	25.1	4.5
				1500	48.2	38.3	99.8	2.91	4.85	6.6	1550	51.1	35.9	0.70	58.2	2.08	24.6	4.7
70	6.0	1.0	2.3	1350	49.7	39.7	104.1	2.92	4.99	6.5	1400	46.6	32.8	0.70	55.0	2.47	18.9	5.8
				1500	50.3	40.3	101.0	2.93	5.03	6.6	1550	47.4	34.6	0.73	56.1	2.56	18.5	6.1
	10.0	2.8	6.5	1350	51.9	41.9	105.6	2.93	5.19	6.9	1400	47.8	33.3	0.70	55.6	2.30	20.8	5.6
				1500	52.5	42.5	102.4	2.94	5.23	7.0	1550	48.6	35.1	0.72	56.7	2.38	20.4	5.9
	12.0	4.1	9.5	1350	52.4	42.4	105.9	2.92	5.26	7.0	1400	48.1	33.4	0.69	55.8	2.27	21.2	5.3
				1500	53.0	43.0	102.7	2.93	5.30	7.1	1550	49.0	35.2	0.72	57.0	2.35	20.9	5.6
80	6.0	1.0	2.3	1350	54.0	44.0	107.0	2.93	5.40	7.2	1400	44.1	31.9	0.72	53.7	2.81	15.7	6.6
				1500	54.7	44.6	103.8	2.95	5.43	7.4	1550	44.8	33.6	0.75	54.7	2.91	15.4	7.0
	10.0	2.7	6.2	1350	56.3	46.3	108.6	2.94	5.61	7.5	1400	45.2	32.3	0.71	54.1	2.61	17.3	6.3
				1500	57.0	46.9	105.2	2.96	5.64	7.6	1550	46.0	34.1	0.74	55.2	2.70	17.0	6.7
	12.0	3.9	9.0	1350	56.9	46.9	109.0	2.94	5.67	7.6	1400	45.5	32.4	0.71	54.3	2.57	17.7	6.2
				1500	57.6	47.5	105.6	2.95	5.72	7.7	1550	46.3	34.2	0.74	55.4	2.66	17.4	6.5
90	6.0	0.9	2.1	1350	58.0	47.9	109.8	2.95	5.76	7.7	1400	41.2	30.7	0.75	52.1	3.18	13.0	7.4
				1500	58.7	48.6	106.2	2.97	5.79	7.8	1550	41.9	32.4	0.77	53.2	3.30	12.7	7.8
	10.0	2.6	6.0	1350	60.5	50.4	111.5	2.96	5.99	8.0	1400	42.3	31.2	0.74	52.4	2.96	14.3	7.0
				1500	61.2	51.0	107.8	2.98	6.02	8.1	1550	43.0	32.8	0.76	53.5	3.07	14.0	7.4
	12.0	3.8	8.8	1350	61.1	51.0	111.9	2.96	6.05	8.1	1400	42.6	31.3	0.73	52.6	2.92	14.6	6.9
				1500	61.8	51.7	108.1	2.97	6.10	8.2	1550	43.3	32.9	0.76	53.6	3.02	14.3	7.3
100	6.0	0.9	2.1	Operation Not Recommended							1400	38.2	29.5	0.77	50.5	3.61	10.6	8.2
											1550	38.9	31.0	0.80	51.7	3.74	10.4	8.6
	10.0	2.5	5.8								1400	39.2	29.9	0.76	50.6	3.35	11.7	7.9
											1550	39.8	31.5	0.79	51.6	3.47	11.5	8.3
	12.0	3.7	8.5								1400	39.5	30.0	0.76	50.8	3.30	12.0	7.7
											1550	40.1	31.6	0.79	51.8	3.42	11.7	8.1
110	6.0	0.9	2.1								1400	35.2	28.1	0.80	49.1	4.08	8.6	8.9
											1550	35.8	29.6	0.83	50.2	4.23	8.5	9.4
	10.0	2.5	5.8								1400	36.1	28.5	0.79	49.0	3.79	9.5	8.6
											1550	36.8	30.0	0.82	50.2	3.93	9.4	9.1
	12.0	3.6	8.3								1400	36.4	28.6	0.79	49.1	3.73	9.8	8.4
											1550	37.0	30.1	0.81	50.2	3.87	9.6	8.8

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT060 Performance Data: Full Load

5.0 Ton, 1750 CFM Heating / 1850 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	15.0	8.8	20.3	1750	44.1	30.9	93.3	3.86	3.35	5.8	Operation Not Recommended							
				2150	45.7	32.2	89.7	3.97	3.37	6.0								
30	7.5	2.1	4.9	1750	44.2	31.1	93.4	3.84	3.37	5.8								
				2150	45.8	32.3	89.7	3.95	3.40	6.0								
	11.5	4.9	11.3	1750	46.2	32.9	94.4	3.89	3.48	6.1								
				2150	47.8	34.2	90.6	3.99	3.51	6.3								
	15.0	8.4	19.4	1750	47.0	33.7	94.9	3.91	3.52	6.2								
				2150	48.7	35.0	91.0	4.02	3.55	6.4								
40	7.5	1.9	4.4	1750	50.0	36.5	96.5	3.96	3.70	6.7								
				2150	51.8	37.9	92.3	4.07	3.73	6.9								
	11.5	4.5	10.4	1750	52.1	38.4	97.6	4.01	3.81	7.0								
				2150	54.0	39.9	93.3	4.13	3.83	7.1								
	15.0	7.7	17.8	1750	53.1	39.3	98.1	4.04	3.85	7.1								
				2150	55.0	40.8	93.7	4.15	3.88	7.4								
50	7.5	1.8	4.2	1750	55.9	41.8	99.6	4.12	3.98	7.4								
				2150	57.9	43.5	94.9	4.23	4.01	7.7								
	11.5	4.2	9.7	1750	58.3	44.1	100.8	4.17	4.10	7.7								
				2150	60.4	45.8	96.0	4.28	4.13	8.0								
	15.0	7.2	16.6	1750	59.4	45.1	101.4	4.19	4.15	7.8								
				2150	61.5	46.8	96.5	4.31	4.18	8.1								
60	7.5	1.7	3.9	1750	61.8	47.2	102.7	4.29	4.22	8.3								
				2150	64.1	49.1	97.6	4.40	4.27	8.5								
	11.5	3.9	9.0	1750	64.5	49.7	104.1	4.34	4.35	8.7								
				2150	66.9	51.7	98.8	4.46	4.39	8.8								
	15.0	6.7	15.5	1750	65.7	50.8	104.8	4.37	4.41	8.9								
				2150	68.1	52.8	99.3	4.49	4.44	9.1								
70	7.5	1.6	3.7	1750	67.7	52.5	105.8	4.46	4.45	8.9								
				2150	70.1	54.5	100.2	4.58	4.48	9.2								
	11.5	3.7	8.5	1750	70.7	55.3	107.4	4.51	4.59	9.4								
				2150	73.2	57.4	101.5	4.64	4.62	9.7								
	15.0	6.4	14.8	1750	72.0	56.5	108.1	4.54	4.65	9.6								
				2150	74.6	58.7	102.1	4.67	4.68	9.9								
80	7.5	1.5	3.5	1750	73.3	57.5	108.8	4.62	4.65	9.8								
				2150	76.0	59.8	102.7	4.75	4.69	10.1								
	11.5	3.6	8.3	1750	76.6	60.6	110.5	4.68	4.80	10.3								
				2150	79.4	63.0	104.2	4.81	4.84	10.4								
	15.0	6.1	14.1	1750	78.0	61.9	111.3	4.71	4.85	10.5								
				2150	80.8	64.3	104.8	4.84	4.89	10.7								
90	7.5	1.5	3.5	1750	78.7	62.4	111.6	4.77	4.83	10.3								
				2150	81.5	64.8	105.1	4.90	4.87	10.7								
	11.5	3.4	7.9	1750	82.1	65.6	113.4	4.83	4.98	10.8								
				2150	85.1	68.1	106.6	4.97	5.02	11.2								
	15.0	5.9	13.6	1750	83.6	67.0	114.2	4.86	5.04	11.1								
				2150	86.7	69.6	107.3	5.00	5.08	11.5								
100	7.5	1.4	3.2	Operation Not Recommended							1850	52.8	39.4	0.75	70.3	5.14	10.3	10.9
											2100	55.9	44.3	0.79	74.8	5.55	10.1	12.2
	11.5	3.4	7.9								1850	53.5	40.0	0.75	70.2	4.90	10.9	10.6
											2100	56.7	44.9	0.79	74.8	5.29	10.7	11.9
	15.0	5.7	13.2								1850	54.1	40.1	0.74	70.5	4.80	11.3	10.2
											2100	57.4	45.0	0.78	75.1	5.19	11.1	11.4
110	7.5	1.4	3.2								1850	48.9	37.9	0.78	68.4	5.70	8.6	11.9
											2100	51.9	42.5	0.82	72.9	6.15	8.4	13.4
	11.5	3.3	7.6								1850	49.6	38.4	0.77	68.2	5.44	9.1	11.7
											2100	52.6	43.1	0.82	72.6	5.87	9.0	13.1
	15.0	5.6	12.9								1850	50.2	38.5	0.77	68.4	5.33	9.4	11.2
											2100	53.2	43.2	0.81	72.8	5.75	9.3	12.6

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT072 Performance Data: Part Load

6.0 Ton, 1800 CFM Heating / 1750 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Air ow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Air ow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	14.0	5.2	12.0	1475	37.8	25.9	93.7	3.48	3.18	5.0	Operation Not Recommended							
				1800	38.8	26.8	90.0	3.53	3.22	5.1								
30	8.0	1.6	3.7	1475	38.6	26.8	94.2	3.47	3.26	5.1								
				1800	39.6	27.6	90.4	3.52	3.30	5.2								
	10.0	2.6	6.0	1475	39.0	27.1	94.5	3.48	3.28	5.2								
				1800	40.1	28.1	90.6	3.53	3.33	5.3								
14.0	5.0	11.6	1475	41.0	29.0	95.7	3.52	3.41	5.4									
			1800	42.2	30.0	91.7	3.58	3.45	5.6									
40	8.0	1.6	3.7	1475	44.8	32.6	98.1	3.56	3.69	6.0								
				1800	46.0	33.7	93.7	3.61	3.73	6.1								
	10.0	2.5	5.8	1475	45.3	33.1	98.4	3.57	3.72	6.1								
				1800	46.6	34.2	94.0	3.63	3.76	6.2								
14.0	4.8	11.1	1475	47.6	35.2	99.9	3.62	3.85	6.4									
			1800	48.9	36.4	95.2	3.67	3.90	6.7									
50	8.0	1.5	3.5	147	51.0	38.7	102.0	3.59	4.16	6.7								
				1800	52.4	39.9	97.0	3.65	4.21	6.9								
	10.0	2.4	5.5	1475	51.6	39.2	102.4	3.62	4.18	6.8								
				180	53.0	40.4	97.3	3.68	4.22	7.0								
14.0	4.7	10.9	1475	54.3	41.6	104.1	3.71	4.29	7.1									
			1800	55.7	42.8	98.7	3.77	4.33	7.3									
60	8.0	1.5	3.5	1475	57.2	44.4	105.9	3.74	4.48	7.6								
				1800	58.7	45.7	100.2	3.80	4.53	7.7								
	10.0	2.3	5.3	1475	57.9	45.1	106.3	3.75	4.52	7.8								
				1800	59.5	46.5	100.6	3.81	4.58	7.9								
14.0	4.5	10.4	1475	60.8	47.8	108.2	3.80	4.69	8.1									
			1800	62.5	49.3	102.2	3.86	4.74	8.4									
70	8.0	1.4	3.2	1475	63.2	50.1	109.7	3.83	4.83	8.3								
				1800	64.9	51.7	103.4	3.88	4.90	8.5								
	10.0	2.3	5.3	1475	64.0	50.9	110.2	3.84	4.88	8.5								
				1800	65.8	52.5	103.8	3.90	4.94	8.7								
14.0	4.4	10.2	1475	67.3	54.0	112.2	3.89	5.07	8.9									
			1800	69.1	55.6	105.5	3.95	5.13	9.1									
80	8.0	1.4	3.2	1475	69.1	55.8	113.4	3.91	5.18	9.2								
				1800	71.0	57.5	106.5	3.96	5.25	9.4								
	10.0	2.2	5.1	1475	70.0	56.6	113.9	3.92	5.23	9.4								
				1800	71.9	58.3	107.0	3.98	5.29	9.6								
14.0	4.3	9.9	1475	73.5	60.0	116.1	3.97	5.42	9.8									
			1800	75.5	61.7	108.8	4.03	5.49	10.0									
90	8.0	1.4	3.2	1475	74.7	61.1	116.9	3.98	5.50	9.9								
				1800	76.8	63.0	109.5	4.04	5.57	10.2								
	10.0	2.1	4.9	1475	75.7	62.1	117.5	3.99	5.56	10.0								
				1800	77.7	63.8	110.0	4.06	5.61	10.3								
14.0	4.2	9.7	1475	79.5	65.7	119.9	4.04	5.77	10.5									
			1800	81.7	67.7	112.0	4.10	5.84	10.8									
100	8.0	1.3	3.0	Operation Not Recommended							1425	48.4	31.3	0.65	62.3	4.06	11.9	8.6
											1750	48.8	35.7	0.73	63.7	4.38	11.1	9.8
	10.0	2.0	4.6								1425	48.7	31.4	0.64	62.1	3.94	12.4	8.3
											1750	49.2	35.8	0.73	63.7	4.25	11.6	9.5
14.0	4.0	9.2	1425								48.9	31.4	0.64	61.9	3.80	12.9	7.9	
			1750								49.3	35.8	0.73	63.3	4.11	12.0	9.0	
110	8.0	1.2	2.8								1425	51.4	29.8	0.58	67.0	4.58	11.2	9.4
											1750	51.9	33.9	0.65	68.8	4.95	10.5	10.7
	10.0	1.9	4.4								1425	51.8	29.8	0.58	67.0	4.45	11.6	9.1
											1750	52.3	34.0	0.65	68.7	4.81	10.9	10.4
14.0	3.7	8.5	1425								52.0	29.8	0.57	66.6	4.29	12.1	8.7	
			1750								52.4	34.0	0.65	68.2	4.64	11.3	9.9	

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

RXT072 Performance Data: Full Load

6.0 Ton, 2150 CFM Heating / 2100 CFM Cooling

				Heating							Cooling							
EWT °F	Flow GPM	WPD		Airflow CFM	HC MBtuh	HE MBtuh	LAT °F	kW	COP W/W	DH MBtuh	Airflow CFM	TC MBtuh	SC MBtuh	S/T	HR MBtuh	kW	EER Btuh/W	DH MBtuh
		PSI	FT															
25	16.0	6.8	15.7	1750	52.7	37.4	97.9	4.49	3.44	6.9	Operation Not Recommended							
				2150	54.6	39.1	93.5	4.54	3.52	7.1								
30	9.0	2.1	4.9	1750	52.5	37.1	97.8	4.52	3.40	6.9								
				2150	54.3	38.7	93.4	4.57	3.48	7.1								
	14.0	5.0	11.6	1750	55.9	40.1	99.6	4.63	3.54	7.4								
				2150	58.0	42.0	95.0	4.68	3.63	7.7								
	16.0	6.6	15.2	1750	56.4	40.6	99.8	4.64	3.56	7.5								
				2150	58.5	42.5	95.2	4.70	3.65	7.8								
40	9.0	2.0	4.6	1750	59.4	43.1	101.4	4.77	3.65	8.0								
				2150	61.6	45.1	96.5	4.83	3.74	8.3								
	14.0	4.8	11.1	1750	63.4	46.7	103.5	4.89	3.80	8.6								
				2150	65.6	48.7	98.3	4.95	3.88	8.6								
	16.0	6.3	14.6	1750	63.9	47.1	103.8	4.91	3.81	8.7								
				2150	66.2	49.3	98.5	4.96	3.91	8.9								
50	9.0	1.9	4.4	1750	66.5	49.4	105.2	5.00	3.90	8.8								
				2150	68.8	51.5	99.6	5.06	3.98	9.1								
	14.0	4.7	10.9	1750	70.9	53.4	107.5	5.13	4.05	9.4								
				2150	73.4	55.7	101.6	5.19	4.14	9.7								
	16.0	6.1	14.1	1750	71.5	54.0	107.8	5.14	4.08	9.5								
				2150	74.1	56.4	101.9	5.20	4.18	9.8								
60	9.0	1.9	4.4	1750	73.7	55.9	109.0	5.23	4.13	10.0								
				2150	76.4	58.3	102.9	5.29	4.23	10.3								
	14.0	4.5	10.4	1750	78.6	60.3	111.6	5.37	4.29	10.6								
				2150	81.5	63.0	105.1	5.43	4.40	10.7								
	16.0	5.9	13.6	1750	79.3	60.9	112.0	5.38	4.32	10.7								
				2150	82.2	63.6	105.4	5.44	4.43	11.0								
70	9.0	1.8	4.2	1750	81.4	62.7	113.1	5.49	4.34	10.8								
				2150	84.3	65.4	106.3	5.55	4.45	11.2								
	14.0	4.4	10.2	1750	86.8	67.6	115.9	5.63	4.52	11.5								
				2150	89.9	70.4	108.7	5.70	4.62	11.9								
	16.0	5.8	13.4	1750	87.6	68.3	116.3	5.65	4.54	11.5								
				2150	90.7	71.2	109.1	5.71	4.65	11.9								
80	9.0	1.8	4.2	1750	89.6	69.8	117.4	5.81	4.52	12.1								
				2150	92.8	72.8	110.0	5.87	4.63	12.5								
	14.0	4.3	9.9	1750	95.5	75.2	120.5	5.96	4.69	12.9								
				2150	98.9	78.4	112.6	6.02	4.81	12.9								
	16.0	5.6	12.9	1750	96.3	75.9	121.0	5.97	4.73	13.0								
				2150	99.8	79.2	113.0	6.04	4.84	13.3								
90	9.0	1.7	3.9	1750	98.4	77.2	122.1	6.21	4.64	13.0								
				2150	101.9	80.5	113.9	6.28	4.75	13.5								
	14.0	4.2	9.7	1750	104.9	83.2	125.5	6.37	4.83	13.8								
				2150	108.7	86.7	116.8	6.44	4.95	14.3								
	16.0	5.4	12.5	1750	105.9	84.1	126.0	6.38	4.86	14.0								
				2150	109.7	87.7	117.2	6.46	4.98	14.5								
100	9.0	1.6	3.7	Operation Not Recommended							1700	54.4	39.0	0.72	72.1	5.18	10.5	10.7
											2100	55.0	41.6	0.76	75.5	6.01	9.2	11.4
	14.0	4.0	9.2								1700	56.3	39.6	0.70	73.1	4.93	11.4	10.3
											2100	56.9	42.2	0.74	76.4	5.72	9.9	11.0
	16.0	5.2	12.0								1700	57.2	39.8	0.70	73.9	4.89	11.7	10.0
											2100	57.8	42.4	0.73	77.2	5.68	10.2	10.6
110	9.0	1.5	3.5	Operation Not Recommended							1700	50.0	37.1	0.74	69.5	5.72	8.7	11.6
											2100	50.5	39.5	0.78	73.2	6.64	7.6	12.4
	14.0	3.7	8.5								1700	51.8	37.6	0.73	70.4	5.45	9.5	11.3
											2100	52.3	40.1	0.77	73.9	6.32	8.3	12.1
	16.0	4.9	11.3								1700	52.6	37.8	0.72	71.1	5.41	9.7	10.9
											2100	53.1	40.3	0.76	74.5	6.27	8.5	11.6

Heating data based on 70F EAT; Cooling data based on 80/67F EAT. See Correction Factors on page 14 for different conditions.

Correction Factors

Heating Correction Factors

EAT °F	HC	HE	kW
50	1.0465	1.1188	0.8024
55	1.0351	1.0918	0.8436
60	1.0253	1.0645	0.8928
65	1.0108	1.0300	0.9454
70	1.0000	1.0000	1.0000
75	0.9895	0.9701	1.0553
80	0.9742	0.9489	1.0518

Cooling Correction Factors

EAT (WB) °F	TC	HR	kW
55	0.8215	0.8293	0.8635
60	0.8955	0.9001	0.9205
63	0.9404	0.9431	0.9547
65	0.9701	0.9715	0.9774
67	1.0000	1.0000	1.0000
70	1.0446	1.0425	1.0335
75	1.1179	1.1124	1.0878

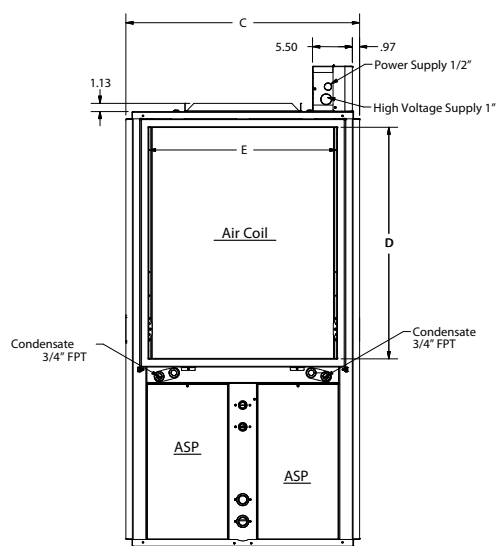
Sensible Cooling Correction Factors

EAT (WB) °F	EAT (DB) °F				
	70	75	80	85	90
55	1.201	1.289			
60	0.943	1.067	1.192		
63	0.855	0.998	1.140		
65	0.797	0.952	1.106	1.261	
67	0.624	0.812	1.000	1.188	1.343
70		0.697	0.820	0.944	1.067
75			0.637	0.817	0.983

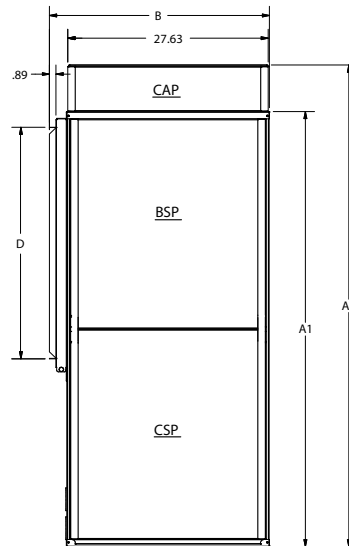
Physical Data

Dual Capacity Vertical					
Model Number	024	036	048	060	072
Fan Wheel (in.)	Future Models	10 x 11	10 x 11	10 x 11	10 x 11
Fan Motor ECM (HP)		.5	1	1	1
Refrigerant Charge (oz.)		72	85	96	118
Air Coil					
Face Area (Sq.Ft.)	Future Models	5.56	6.25	6.25	6.25
Dimensions (in.)		32 x 28.5 x 2.1	36 x 28.5 x 2.2	36 x 28.5 x 2.8	36 x 28.5 x 2.8
Number Of Rows		3	3	4	4
Filter 1"Thick		28 x 30 x 1	28 x 34 x 1		
Unit Weight (nominal) - lbs		420	510	510	510

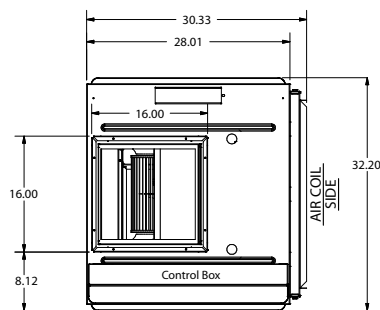
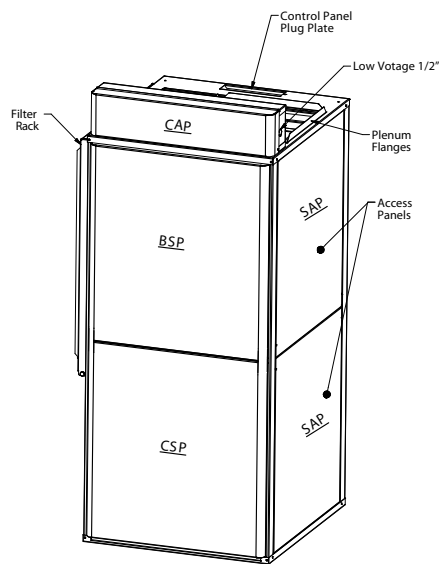
Dimensional Data: Vertical Upflow Configuration



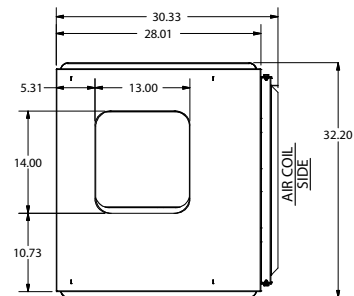
Left View



Front & Back View



Top View
Top Discharge



Bottom View
Bottom Discharge

LEGEND:

SAP= Service Access Panel
BSP= Blower Service Panel
CSP= Compressor Service Panel
CAP= Control Access Panel
ASP= Access Service Panel
FPT= Female Pipe Thread

Model	Dimensional Data without Control Box			Dimensional Data with Control Box	Supply Air (Top Discharge)		Supply Air (Bottom Discharge)		Return Air	
	Height (A1)	Width (B)	Depth (C)		Width	Depth	Width	Depth	Width (E)	Height (D)
024 - 036	56.1	30.3	32.2	62.5	16.0	16.0	13.0	14.0	26.0	28.0
048 - 072	60.1	30.3	32.2	66.5	16.0	16.0	16.0	16.0	26.0	32.0

Notes:

All Desuperheater connections are 3/4" FPT.
All measurements are in inches.
Ground loop connections are 1" FPT

Electrical Data

Two-Stage Packaged Units

Model	Voltage Code	60Hz Power		Compressor		ECM Fan Motor FLA	HWG Pump FLA	Ext Loop Pump FLA*	Total Unit FLA	Min Circuit AMPS	Max Fuse HACR	Min AWG	Max Ft
		Volts	Phase	LRA	RLA								
024	Future Model												
036	1	208-230	1	82.0	16.7	4.3	0.5	4.0	25.5	29.7	45	10	65
048	1	208-230	1	96.0	21.2	7.0	0.5	5.5	34.2	39.5	60	8	74
060	1	208-230	1	118.0	25.6	7.0	0.5	5.5	38.6	45.0	70	6	105
072	1	208-230	1	150.0	27.2	7.0	0.5	5.5	40.2	47.0	70	6	101

Notes:

1. All line and low voltage wiring must adhere to the National Electrical Code and local codes, whichever is the most stringent.
2. Wire length based on a one way measurement with a 2% voltage drop.
3. Wire size based on 60°C copper conductor and minimum circuit ampacity.
3. All fuses class RK-5.
4. Min/Max Voltage: 208-230/60/1 = 197/243.

*The external loop pump FLA is based on a maximum of three UP26-116F-230V pumps (1/2hp) for 048 - 072 and two pumps for 024 - 036.

Electrical Data:

Auxiliary Heater Electrical Data

TECHNICAL DATA (AHTR Electric Heaters only) Single Phase w/ Circuit Breaker												
Heater Model	Supply Voltage	Heat kW	Supply Circuit Number	Heater kW Per Circuit	FLA Total AMPS	MCA Min Circuit Ampacity	Maximum Over-Current Protective Device (AMPS.)	Recommended				
								Supply Wire 75°C. Copper			Ground Wire	
								# of Wires	Wire Size	Max Length (Ft)	# of wires	Min Size
AHTR101B	240	10	Single	5	41.7	52.1	60	2	6	101	1	10
	208	7.5	Single	3.75	36.1	45.1		2	6	115	1	10
AHTR151B*	240	15	Mult. 1	5	20.8	26.0	30	2	10	118	1	10
	240		Mult. 2	10	41.7	52.1	60	2	6	101	1	10
	208	11.25	Mult. 1	3.75	18.0	22.5	30	2	10	118	1	10
	208		Mult. 2	7.5	36.1	45.1	60	2	6	101	1	10
AHTR201B**	240	20	Mult. 1	10	41.6	52.0	60	2	6	101	1	10
	240		Mult. 2	10	41.6	52.0	60	2	6	101	1	10
	208	15	Mult. 1	7.5	48.1	60.0	60	2	6	101	1	10
	208		Mult. 2	7.5	48.1	60.0	60	2	6	101	1	10

* Not recommended for size 024.

** Not recommended for sizes 024-036.

Controls

MICROPROCESSOR FEATURES AND OPERATION

Roth's geothermal heat pump controls provide a unique modular approach for controlling heat pump operation. The control system uses one, two, or three printed circuit boards, depending upon the features of a particular unit. This approach simplifies installation and troubleshooting, and also eliminates features that are not applicable for some units.

A microprocessor-based printed circuit board controls the inputs to the unit as well as outputs for status mode, faults, and diagnostics. A status LED and an LED for each fault is provided for diagnostics. An ECM control module provides field selectable options for airflow and dehumidification mode, plus an LED to indicate CFM (100 CFM per flash). If the combination unit is desired (combination water-to-air and water-to-water heat pump), a third board controls the hydronic portion of the unit, allowing field selectable hot water/forced air priority and other options.

Removable low voltage terminal strips provide all necessary terminals for field connections. Not only are the thermostat inputs included, but there are also two additional removable terminal strips for all of the accessory and electric heat wiring for ease of installation and troubleshooting.

Startup/Random Start

The unit will not operate until all the inputs and safety controls are checked for normal conditions. At first power-up, the compressor is energized after a five minute delay. In addition, a zero to sixty second random start delay is added at first power-up to avoid multiple units from being energized at the same time.

Short Cycle Protection

A built-in five minute anti-short cycle timer provides short cycle protection of the compressor.

Component Sequencing Delays

Components are sequenced and delayed for optimum space conditioning performance and to make any startup noise less noticeable.

Test Mode

The microprocessor control allows the technician to shorten most timing delays for faster diagnostics by changing the position of a jumper located on the lockout board.

Water Solenoid Valve Connections

Two accessory relay outputs at the terminal strip provide a field connection for two types of water solenoid valves, a standard 24VAC solenoid valve, or a 24VAC solenoid valve with an end switch. Additional field wiring is no longer required for operation of the end switch.

Humidifier/Dehumidification Connections

Connections for a humidistat are provided, which automatically engages the fan when the humidistat contact closes. In addition, a field connection is provided at the terminal strip for external control of the On Demand Dehumidification (ODD) feature for the variable speed ECM motor (when equipped), which automatically lowers the fan speed when the space humidity is higher than set point. Either connection may be used with a thermostat that includes humidifier/dehumidification outputs. Not applicable for splits/water-to-water.

Airflow Monitor (Units with ECM Motor)

An LED on the ECM control module flashes one time per 100 CFM when the unit's fan is operating to indicate airflow.

Resistance Heat Control

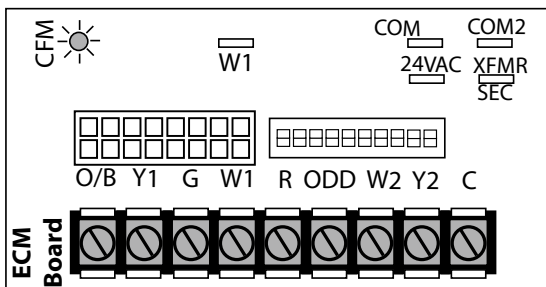
The electric heat control module contains the appropriate high-voltage control relays. Low voltage control signals from the compressor section energize the relays in the electric heat module to engage backup electric heat when necessary.

Electronic Condensate Overflow Protection

The control board utilizes an impedance sensing liquid sensor at the top of the drain pan. Since the drain pan is grounded, when water touches the sensor for 30 continuous seconds, the sensor sends a ground signal to the lockout board, indicating that a condensate overflow fault has occurred.

Controls

ECM Board Layout



Loop Pump Circuit Breakers (Single Compressor Units)

The loop pump(s) and desuperheater pump are protected by control box mounted circuit breakers for easy wiring of pumps during installation. Circuit breakers eliminate the need to replace fuses.

Safety Controls

The control receives separate signals for high pressure, low pressure, low water flow, and condensate overflow faults. Upon a continuous 30-second measurement of the fault (immediate for high pressure), compressor operation is suspended (see Fault Retry below), and the appropriate LED flashes. Once the unit is locked out (see Fault Retry below), an output (terminal "L") is made available to a fault LED at the thermostat (water-to-water unit has fault LED on the corner post).

Low Pressure: If the low pressure switch is open for 30 continuous seconds, the compressor operation will be interrupted, and the control will go into fault retry mode. At startup, the low pressure switch is not monitored for 90 seconds to avoid nuisance faults.

High Pressure: If the high pressure switch opens, the compressor operation will be interrupted, and the control will go into fault retry mode. There is no delay from the time the switch opens and the board goes into fault retry mode. There is also no delay of switch monitoring at startup.

Flow Switch: If the flow switch is open for 30 continuous seconds, the compressor operation

will be interrupted, and the control will go into fault retry mode. At startup, the flow switch is not monitored for 30 seconds to avoid nuisance faults.

Condensate Overflow: If water touches the condensate overflow sensor for 30 continuous seconds, the compressor operation will be interrupted, and the control will go into fault retry mode. There is no delay of switch monitoring at startup.

FAULT RETRY

All faults are retried twice before finally locking the unit out. The fault retry feature is designed to prevent nuisance service calls. There is an anti-short cycle period between fault retries. On the third fault, the board will go into lockout mode.

Over/Under Voltage Shutdown

The lockout board protects the compressor from operating when an over/under voltage condition exists. The control monitors secondary voltage (24VAC) to determine if an over/under voltage condition is occurring on the primary side of the transformer. For example, if the secondary voltage is 19 VAC, the primary voltage for a 240V unit would be approximately 190V, which is below the minimum voltage (197V) recommended by the compressor manufacturer. This feature is self-resetting. If the voltage comes back within range, normal operation is restored. Therefore, over/under voltage is not a lockout.

Under voltage (18 VAC) causes the compressor to disengage and restart when the voltage returns to 20 VAC. Over voltage (31 VAC) causes the compressor to disengage and restart when the voltage returns to 29 VAC. During an over or under voltage condition, all five fault LEDs will blink (HP + LP + FS + CO + Status). When voltage returns to normal operation, the four fault LED's will stop blinking, but the status LED will continue to flash. While the board LEDs are flashing, the thermostat fault light will be illuminated.

Controls

Intelligent Reset

If the thermostat is powered off and back on (soft reset), the board will reset, but the last fault will be stored in memory for ease of troubleshooting. If power is interrupted to the board, the fault memory will be cleared.

Lockout with Emergency Heat

While in lockout mode, if the thermostat is calling for backup heat, emergency heat mode will occur.

Diagnostics

The lockout board includes five LEDs (status, high pressure, low pressure, low water flow, condensate overflow) for fast and simple control board diagnosis. Below is a table showing LED function.

LED Identification

LED Color	Location ¹	Function	Normal Operation	Fault Retry ²	Lockout ²
Green	Top	High Pressure	OFF	Flashing ³	ON ³
Orange	2nd	Low Pressure	OFF	Flashing ³	ON ³
Red	3rd	Water Flow	OFF	Flashing ³	ON ³
Yellow	4th	Condensate Overflow	OFF	Flashing ³	ON ³
Green	Bottom	Status	Flashing ⁴	Flashing ⁵	Flashing ⁴

Notes:

1. Looking at the board when the LEDs are on the right hand side
2. If all five lights are flashing, the fault is over/under voltage
3. Only the light associated with the particular fault/lockout will be on or flashing.
For example, if a high pressure lockout has occurred, the top green light will be on.
The orange, red, and yellow lights will be off
4. Status lights will be off when in test mode
5. Flashes alternately with the fault LED

Hot Water Pump Control

Controls for high water temperature and low compressor discharge line temperature prevent the hot water (desuperheater) pump from operating when the leaving water temperature is above 130°F, or when the compressor discharge line is too cool to provide adequate water heating.

Lockout Board Jumper Selection

The lockout board includes three jumpers for field selection of various board features.

Water Solenoid Valve Delay (WSD): When the WSD jumper is installed, the "A" terminal is energized when the compressor is energized. When the jumper is removed, the "A" terminal is energized 10 seconds after the compressor.

If using the Taco water solenoid valve (or a valve with an end switch), the unit terminal strip includes a means for connecting a valve of this type. The WSD jumper should be installed. If using a slow opening valve that does not have an end switch, the jumper should be removed.

Test Mode (TEST): When the TEST jumper is installed, the board operates in the normal mode. When the jumper is removed, the board operates in test mode, which speeds up all delays for easier troubleshooting. When service is complete, the jumper must be re-installed in order to make sure that the unit operates with normal sequencing delays.

Over/Under Voltage Disable (O/V): When the O/V jumper is installed, the over/under voltage feature is active. When the jumper is removed,

Controls

the over/under voltage feature is disabled. On rare occasions, variations in voltage will be outside the range of the over/under voltage feature, which may require removal of the jumper. However, removal of the jumper could cause the unit to run under adverse conditions, and therefore should not be removed without contacting technical services. An over/under voltage condition could cause premature component failure or damage to the unit controls. Any condition that would cause this fault must be thoroughly investigated before taking any action regarding the jumper removal. Likely causes of an over/under voltage condition include power company transformer selection, insufficient entrance wire sizing, defective breaker panel, incorrect transformer tap (unit control box), or other power-related issues.

SEQUENCE OF OPERATION:

Water-to-Air Units, Single Compressor, ECM Fan

Heating, 1st Stage (Y1,G) Single Speed Units

The fan motor is started immediately at 75% CFM level, the compressor and loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received, and the ECM fan adjusts to 100% CFM level 30 seconds after the "Y1" input.

Heating, 2nd Stage (Y1,W,G) Single Speed Units

The ECM fan remains at 100% of 1st stage CFM level, and the electric backup heat is energized.

Heating, 1st Stage (Y1,G) Two-Stage Units

The ECM fan is started immediately at 75% (of 1st stage operation) CFM level, first stage compressor and the loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received, and the ECM fan adjusts to 100% (of 1st stage operation) CFM level 30 seconds after the "Y1" input.

Heating, 2nd Stage (Y1,Y2,G) Two-Stage Units

The ECM fan adjusts to 2nd stage CFM level, and the compressor full load solenoid valve is energized.

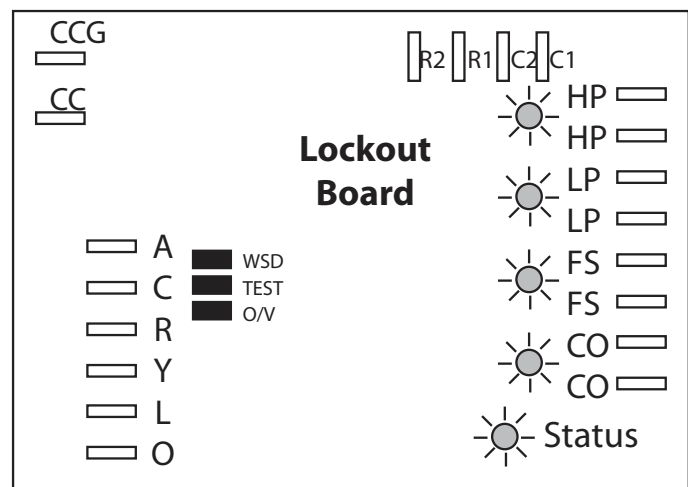
Heat, 3rd Stage (Y1,Y2,W,G) Two-Stage Units

The ECM fan remains at 100% of 2nd stage CFM level, and the electric backup heat is energized.

Emergency Heat (W,G)

The fan is started immediately at 110% of 2nd stage CFM level, and the electric backup heat is energized.

Lockout Board Layout



Cooling Operation

The reversing valve is energized for cooling operation. Terminal "O" from the thermostat is connected to the reversing valve solenoid.

Cooling (Y1,O,G) Single Speed Units

The fan motor is started immediately at 75% CFM level, the compressor and loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received, and the ECM fan adjusts to 100% CFM level 30 seconds after the "Y1" input.

Cooling, 1st stage (Y1,O,G) Two-Stage Units

The ECM fan is started immediately at 75% (of 1st stage operation) CFM level, first stage compressor and the loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received, and the ECM fan adjusts to 100% (of 1st stage operation) CFM level 30 seconds after the "Y1" input.

Controls

Cooling, 2nd Stage (Y1,Y2,O,G) Two-Stage Units

The ECM fan adjusts to 2nd stage CFM level, and the compressor full load solenoid valve is energized.

Cooling, Dehumidification Mode

The ECM control module includes two types of dehumidification modes, Forced Dehumidification mode, and On Demand Dehumidification (ODD). If the ECM control module is set to Forced Dehumidification mode, the ECM fan runs at normal CFM in all heating stages, but all cooling operation will be 85% of the current stage CFM level, which lowers the CFM through the evaporator coil, improving latent capacity. In ODD mode, a humidistat or a thermostat with a dehumidification output (output must be reverse logic -- i.e. it must operate like a humidistat) is connected to the ODD terminal. When the module receives a call for dehumidification, the fan runs at 85% of the current stage CFM in the cooling mode. Otherwise, the airflow is at the normal CFM level. The signal is ignored in the heating mode.

Fan Only

When the ECM control module receives a "G" call without a call for heating or cooling, the fan operates at 50% of the full load CFM level.

SEQUENCE OF OPERATION:

Water-to-Air Units, Single Compressor, PSC Fan

Heating, 1st Stage (Y1,G)

The fan motor is started immediately, the compressor and loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received.

Heating, 2nd Stage (Y1,W,G)

The compressor continues to operate, and the electric backup heat is energized when a "W" input is received.

Emergency Heat (W,G)

The fan and electric backup heat are energized immediately when a "W" input is received.

Cooling Operation

The reversing valve is energized for cooling operation. Terminal "O" from the thermostat is connected to the reversing valve solenoid.

Cooling (Y1,O,G)

The fan motor is started immediately, the compressor and loop/desuperheater pump(s) are energized 10 seconds after the "Y1" input is received.

Fan Only

When the control receives a "G" call without a call for heating or cooling, the fan operates at the heating/cooling CFM level.

Controls

ECM Fan Performance - Two-Stage Compressor Units

Model ¹	Program ²	Heating Modes		Cooling Modes		Dehumidification Mode ⁶		Only Fan	DIP Switch Settings ⁴							
		1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage		S1	S2	S3	S4	S5	S6	S7	S8
024	Future Model															
036	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B	1050	1300	1050	1300	893	1105	650	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
	C	900	1200	900	1200	765	1020	550	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	D	850	1050	850	1050			500	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
048	A	1500	1750	1550	1850	1318	1573	925	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
	B	1400	1650	1400	1700	1190	1445	850	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
	C	1275	1500	1275	1550			775	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
	D	1150	1350	1150	1400			700	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
060	A	1800	2150	1750	2100	1488	1785	1050	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
	B	1500	1750	1550	1850	1318	1573	925	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
	C	1350	1600	1400	1675			825	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
	D	1225	1425	1250	1500			750	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
072	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B	1800	2150	1750	2100	1488	1785	1050	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
	C	1625	1950	1600	1900	1360	1615	950	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	D	1475	1750	1425	1700			850	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

Notes:

1. Program B (Bold type) is factory settings and rated CFM. CFM is controlled within 5% up to the max. ESP.

Max. ESP includes allowance for wet coil and standard filter.

2. Power must be off to the unit for at least 3 seconds before the ECM motor will recognize a speed change.

Dehumidification Mode Options

DIP Switch		Mode	Operation
S9	S10		
ON	OFF	Normal	Dehumidification mode disabled (normal Htg/Clg CFM) - factory setting
OFF	ON	ODD	On Demand dehumidification mode (humidistat input at terminal ODD) - Humidistat required
OFF	OFF	Constant Dehum	Constant dehumidification mode (always uses dehum CFM for cooling and normal CFM for heating) - No humidistat required
ON	ON	Not Used	Not an applicable selection

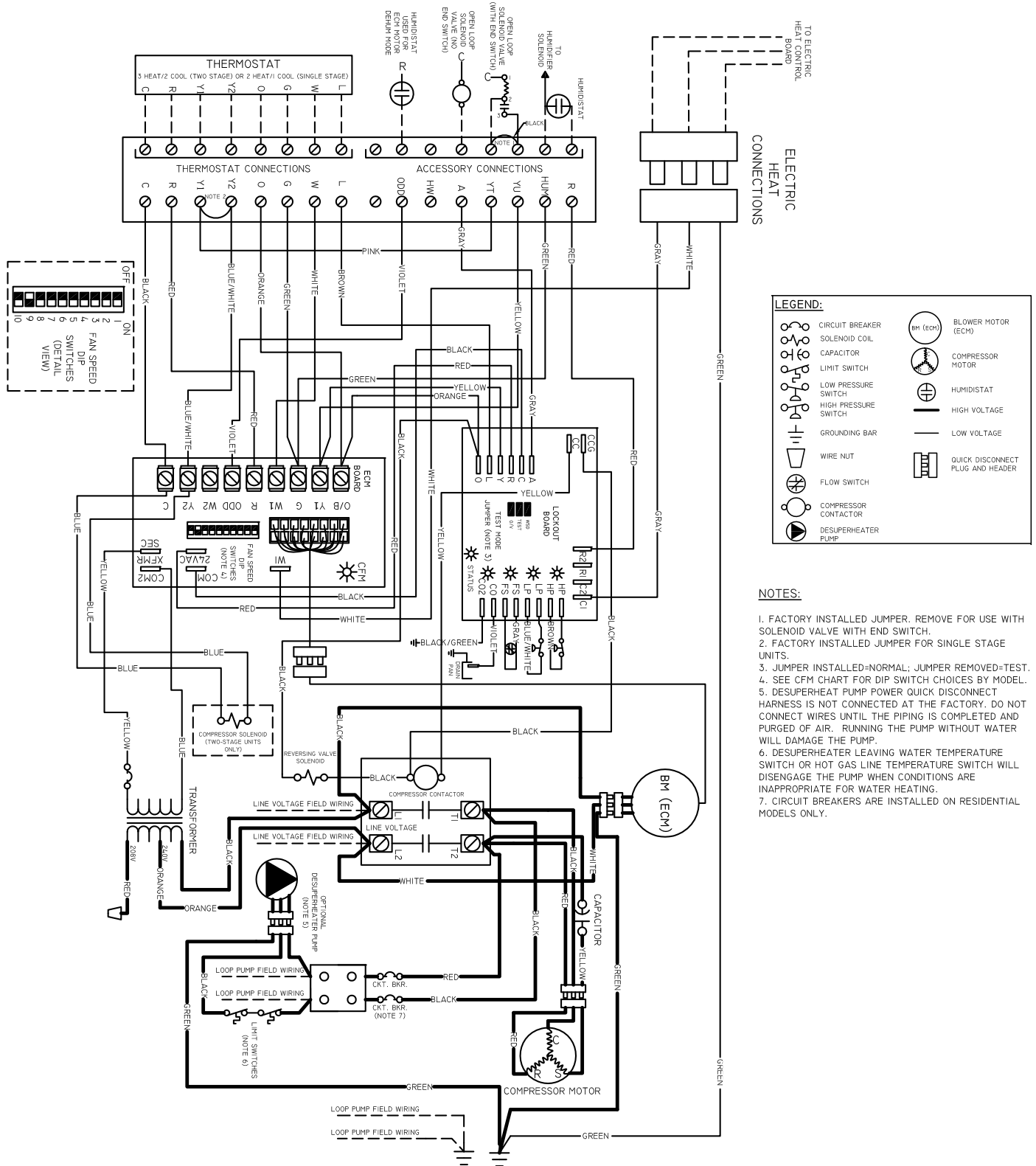
Notes:

1. ODD uses reverse logic, which allows a humidistat to be used for this feature instead of a dehumidistat.

To enter dehumidification mode, ODD input should be 0 VAC; for normal cooling CFM, ODD input should be 24VAC.

2. Heating CFM is not affected by dehumidification mode. When in dehumidification mode, cooling CFM is 85% of normal cooling CFM (when not in dehumidification mode).

Controls



Engineering Specifications

General

The Geothermal Heat Pump system and the earth loop shall be one system and include all interconnecting piping and controls to provide an efficient, harmoniously balanced package. All units shall be tested and rated by ETL in accordance with UL and CSA test laboratory safety and performance standards. Each unit shall be computer run-tested at the factory. Capacities and efficiencies shall be certified by AHRI and meet CSA standards. Each unit shall be mounted on a pallet and shipped in a corrugated box. Units shall be designed to operate with entering liquid temperature between 25°F and 110°F.

Refrigerant Circuit

Compressor shall be hermetically sealed high efficient two-stage scroll, quadruple-isolated. The air heat exchanger (coated) coil shall use high-density technology, low-face velocity and incorporate enhanced aluminum fins bonded to copper tubing not less than three rows deep, and be e-coated for corrosion protection. The coaxial water heat exchanger shall be designed for low water pressure drop and constructed of an optional cupro-nickel or standard copper inner tube and a steel outer tube with enhanced heat exchanger surface. Water heat exchanger shall be encapsulated in an air-tight foamed enclosure to prevent condensation at low temperature operation. An optional domestic water desuperheater coil of vented double wall copper construction for potable water with high limit control shall be employed. The thermostatic expansion device shall be bi-directional, mechanical controlled and shall provide proper superheat over the entire liquid temperature range with minimal hunting. The reversing valve shall be of copper construction with a 24V AC solenoid valve with fail-to-heating position.

Cabinet

The cabinet shall be of heavy gauge steel with powder coat finish (front access panels shall be brushed stainless steel). It shall incorporate a stainless steel condensate pan and be installed with high-density insulation, with smoke and flame spread of class 1 type and acoustic value of NRC 45. It shall be oriented to allow complete component service access from all sides. Electrical box shall be of heavy gauge steel located on the top of the cabinet for eye-level access. A duct collar shall be provided for the supply air opening (field-installed) and a return air filter, rack & duct collar shall be provided on the return air opening. Standard size 1-inch filters shall be provided with each.

Controls and Blower Motor

Units shall incorporate a microprocessor based control board. All equipment shall incorporate both high and low pressure switches and freeze protection (via flow switch) with total refrigerant circuit lockout with manual reset. The board shall provide a terminal block, LED status, fault indicators, fault memory and accessory output. All units shall have knockouts for entrance of line & low voltage wiring.

Fan Motor & Assembly

The fan shall be a direct driven type. The motor shall be a variable-speed ECM motor with direct drive blower that can be easily removed from the heat pump without duct disconnection. The ECM fan motor shall be soft starting and maintain constant CFM over its operating static pressure range. The fan motor shall be isolated from the housing by rubber grommets. The ECM motors shall be long life ball bearing type.

Piping & Connections

Loop water connections (supply/return) shall be 1-inch FPT fittings, which provide a union for easy connection. All water piping shall be insulated to prevent condensation at low water temperatures. The condensation connection shall be 3/4" female threaded connection.

Note: Copper is the only acceptable material for piping the desuperheater.

Secondary Drain Pan

A secondary drain pan should be field furnished and installed under the unit, on horizontal unit or any other unit that is mounted overhead in an attic or second floor, or where required by local code.

Options, Accessories, & Warranty

Desuperheater

Optional desuperheater package of vented double wall copper constructed heat exchanger coil suitable for potable water shall be provided. The heat exchanger and hot water circulating pump shall be factory installed inside the cabinet.

Field Installed Hydronic Pump Module (Flow Center)

Pump module shall be self contained and provide all liquid flow, liquid fill and connection required for earth loop system. The pumps shall be wired to the pump terminal strip inside unit electric box.

Field Installed Thermostat

A multiple-stage manual or autochangeover electronic/digital thermostat shall be provided with the unit. The thermostat shall provide two or three stage heating and one or two stage cooling with comfort temperature control. An AUTO-OFF fan switch, an EMERG-HEAT OFF- COOL-AUTO system switch, and indicating LEDs. The thermostat shall provide display in °F or °C. An option remote outdoor sensor shall be available.

Field Installed Electric Auxiliary Heater

An Electric resistance heater shall provide emergency and/or supplemental heating. Vertical unit shall have the control console and element (coils) assembly mounted internally. The heater shall provide operation control based upon signals from the thermostat or compressor section controls. A Low Voltage wiring harness shall be provided with electric heat package. (Vertical Units Only)

Zone Control System

Call your Factory representative for information on Zoning.



STANDARD RESIDENTIAL WARRANTY

Roth Industries, Inc. for brand: TerraStar Residential Single Family

10 YEAR LIMITED WARRANTY (10/5/5)

Roth Industries, Inc. warrants the refrigerant system components, to include the compressor, air coil, coaxial heat exchanger(s), expansion valve and reversing valve, to be free from defects in material and workmanship for a period of ten (10) years from the date of delivery to the original purchaser-user, transferable to new owner.

Roth Industries, Inc. warrants its geothermal unit against defect in materials and workmanship for five (5) years from the date of delivery to the original purchaser-user, excluding damage due to rough handling, abuse, accident or casualty loss, exposure to outdoor elements/outdoor installation, including but not limited to: salt air exposure, damage caused by exposure to the following (whether indoors or outdoors): chlorine, airborne contaminants, other corrosive elements in the atmosphere, swimming pools, or hot tubs, transferable to new owner. NOTE: Accessories included in the original installation (thermostat, flow center, auxiliary heater) are covered by this five (5) year warranty but are not included in owner transfer.

Roth Industries, Inc. warrants the service labor allowances for five (5) years (second through the fifth years with the dealer/installer warranting the first year) from date of delivery to the original purchaser/user, transferable to new owner, for the servicing, removing or reinstalling parts for the refrigerant system, or for any defect in materials and workmanship inside the unit as set forth above.

NOTE: Labor allowances may not cover the full amount of labor charged, depending on the servicing contractor.

CONDITIONS AND EXCLUSIONS:

The Limited Warranty only applies if the following conditions are met.

A) This Limited Warranty will not apply and shall be null and void if the Roth Industries, Inc. serial number has been altered, defaced or removed.

B) This Limited Warranty shall be null and void if the Roth Industries, Inc. unit has been disconnected or removed from the location of original installation, or if the dealer/installer has not been paid in full.

C) This Limited Warranty shall not apply to unit failure or defunct caused by improper installation, field modification, improper supply voltage, improper maintenance or misuse including operation during building construction, corrosion caused by airborne contaminants, chlorine or salt air exposure, corrosive liquids or water, abuse, neglect, Act of God, outdoor installation or storage prior to installation, damage from abuse, accident, fire, flood, and the like, or to defects or damage caused by the use of any attachment, accessory or component not authorized by Roth Industries, Inc.

D) Replacement or repaired parts and components are warranted only for the remainder of the original warranty period, as stated above.

E) This Limited Warranty applies only to Roth Industries, Inc. units installed by a factory trained, independent, Dealer of Roth Industries, Inc. in the United States or Canada, and subjected to normal usage as described and rated on the applicable specification sheet for each unit. This warranty shall not be valid if equipment is not installed in accordance with methods prescribed on our technical data and manuals and in compliance with local codes. Dealer must complete the warranty registration card supplied with the Roth Industries, Inc. unit which must then be endorsed by the original purchaser-user and mailed within ten (10) days after initial installation. If warranty registration card is not returned, warranty shall commence at date unit was shipped from Roth Industries, Inc. manufacturing facility.

F) The obligation for Roth Industries, Inc. under this Limited Warranty is expressly limited to replacement of any parts or components as specified and found within the cabinet. Roth Industries, Inc. reserves the right to replace defective components under warranty with new or reconditioned parts. Except as set forth above, this warranty does not cover any labor expenses for service, nor for removing or reinstalling parts. Accessory, peripheral and ancillary parts and equipment are not covered by this warranty.

G) Roth Industries, Inc. does not warrant equipment which has been custom built or modified to purchaser-user specifications. Likewise, any field modification of any equipment shall also void this, and any and all warranties.

Notice: Outdoor or unconditioned space installation or storage prior to installation of any equipment shall cause this and all warranties to be deemed void.

SHIPPING COSTS: The purchaser-user will be responsible for the cost of shipping warranty replacement parts from the Roth Industries, Inc. manufacturing location to the distributor of the parts. Purchaser-user is also responsible for any shipping cost of returning the failed part to the distributor.

THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (AND IMPLIED CONDITIONS IN CANADA), EXPRESSED, IMPLIED, AND STATUTORY, INCLUDING WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH WARRANTIES EXPRESSED OR IMPLIED, ARE EXCLUDED AND SHALL NOT APPLY TO THE GOODS SOLD. IN NO EVENT SHALL WARRANTOR BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE GOODS EXCEPT TO THE EXTENT SET FORTH HEREIN.

(Some states do not allow exclusion or limitation of implied warranties or liability for incidental or consequential damage). For additional information or assistance, contact the WARRANTOR, which is: Roth Industries, Inc., 268 Bellew Ave. S., Watertown, NY 13601

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* AHRI certification is shown as the Roth brand under the Enertech Manufacturing certification reference number

**Roth Industries geothermal heat pumps are shown as a multiple listing of Enertech Manufacturing's ETL certification

*** Roth geothermal heat pumps are listed as a brand under Enertech Manufacturing's Energy Star ratings